NATURAL HISTORY IN THE GRADES

OTIS W. CALDWELL
The University of Chicago

V. FIFTH GRADE

In presenting this statement of the work done in the fifth grade, especial recognition should be made of the assistance given by Miss Myrta McClellan, who has taught the nature-study in the Fifth Grade for the greater part of the school year, and to Miss Ada Milam, who is completing the year's work. The lesson outlines that are appended are those used by Miss McClellan, and the pupils' papers are the uncorrected written discussions prepared under Miss Milam's direction.

The nature materials used in this grade are chiefly plants and animals, these being centered largely about the work of the garden. A study is made of the processes involved, the habits of life, and conditions affecting the successful development of plants and animals and control of these conditions. Although the topics included in the grade are here listed under three headings, they are considered in their relations to one another.

1. *Animal life.*—In the preceding grades opportunity has been given for general acquaintance with a few common insects. Using this acquaintance as a basis, the attitude of investigation may be developed by a somewhat detailed study of a stand of bees, their communal life, their structure, the uses made of the parts of the body as in flying, walking, feeding, carrying food, and in protecting themselves against enemies; the honeycomb, its structures and uses, rate at which nectar is made into honey and deposited in honey cells, the kinds of flowers upon which bees are working, in what seasons and on what kinds of days do bees work most; the queen bee, care of eggs, larvae, and the young bees; swarming; enemies of honey-bees. Brief study of bumble bees and reading assignments upon habits of bees. During the two years preceding this year bees were kept in the

University Elementary School and studied by the Fifth Grade. An observation hive, especially well adapted for class or individual study (sold by A. I. Root Co., Medina, Ohio), was kept in the schoolroom for a part of the time. It was so placed that the bees passed in and out through a window, but were always observable from within. The sides and top of the box could be removed and the interior of the hive readily studied.

FIG. 1.—The children are preparing the bees for winter by closing the hive and carrying it into a cool room where it will remain until spring. Some of the children who are afraid of being stung by the bees have covered their heads and hands with cheese cloth.

One or two lessons upon wasps as relatives of the bees are interesting at this point. Include the homes and habits of the "mud-dauber" wasps; the way in which they store food in the cells for the use of their larvae, the lint-cutting habits of some wasps and hornets, a comparison of this lint with wood pulp from which paper is manufactured.

A study is made of the industrial significance of domesticated

plants and animals, including corn, cotton, wheat, horses, cows, cattle, and sheep. The history and improvement of these things are left for the Seventh Grade. In preceding grades considerable work has been done with identification of birds. In this grade a study is made of birds as factors in the life of the community, and of state regulations for bird protection. There are many excellent helps for the teacher upon this topic, among which are: *Useful Birds and Their Protection,* by E. H. Forbush, published by the Massachusetts Board of Agriculture, Boston, Mass.; "The Economic Values of Some Common Illinois Birds," by Alfred O. Gross and Stephen A. Forbes, published in the *Arbor and Bird Day Annual of 1909,* by the Superintendent of Public Instruction, Springfield, Ill.; and chaps. xviii, xix, xx, and xxi in Hodge's *Nature-Study and Life,* published by Ginn & Co.

2. *Plant life.*—In the schoolroom plants are grown in aquaria and pots, and propagation is studied by use of slips and cuttings of geranium, coleus, begonia, wandering-jew, willow, etc. The pupils are instructed in the proper methods of making cuttings. The reasons for retaining two or three leaves, two or three inches of the stem, and the terminal buds are discussed. The relative advantage of pruning away parts of the leaves may be shown by planting some with and some without this pruning and noting the later growth. The cuttings are planted at such a depth that the terminal bud and leaves stand immediately above the sand. They should then be covered by a square of glass so that constant moisture and temperature may be maintained, care being taken to ventilate the plants frequently. In ten days or two weeks the glass may be kept propped up, and a few days thereafter it may be removed permanently. Throughout, frequent examination of one or two plants should be made to study the origin and development of roots. When well rooted, plants should be potted in two-inch pots in rich soil. If properly watered and lighted they may be grown in these pots until the outdoor gardens are ready for planting, when the potted plants furnish excellent material with which to get early results in the garden.

Rusts and insects that are injurious to plants, methods of

prevention, insect galls, and a few observations upon the life-cycle of some insect-producing galls are topics of great interest. Weeds were studied chiefly in connection with seed distribution and the garden. As shown in the appended lesson plans there was an autumn field trip for the collection of seeds of many kinds. Weed seeds were planted and germinated in the school-

FIG. 2

room, and the characteristics noted so that in future garden work this knowledge may be used in proper care of the garden. Structures and agencies of seed distribution were studied in detail, a small inexpensive hand lens proving of much assistance and interest in this connection. The advantage of wide seed distribution, and the relative probability of all seeds developing into mature plants are included. A brief review of the work of the lower grades upon plant structures and how a plant works, serves

as the basis for a study of the plant life-cycle which is completed by a study of the flower as a means of seed formation. The parts of a flower and the function of each part in seed formation, omitting all technical details, are studied. Pollination in different common plants and agencies for securing it are fascinating topics. Reproduction of seed plants furnishes an addition to the series which began in the Second Grade, in which series a study has been made of methods of establishing new living things. This is a most important aspect of nature-study, and the whole series,

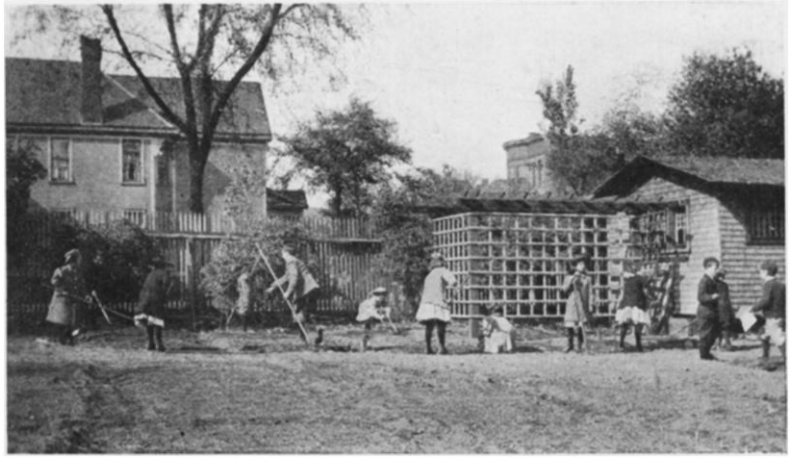

FIG. 3.—Fifth-grade children working in their gardens. Their plans were made before outdoor work began and they are now planting according to these plans. Note also the grape arbor at the left end of the toolhouse. The lattice-work was put on by the fifth-grade pupils.

together with the studies of how individual plants and animals live, should make a good basis for the study of hygiene in the Sixth Grade.

3. *Garden work.*—In the late autumn this grade is assigned to the work of building a "cold frame" in which it is expected that early vegetables and flowering plants will be produced. In spring and summer each pupil has his own garden, makes his own plan subject to the approval of his teacher, does his own planting and cultivation, and owns the results of his work.

Individual ownership and responsibility are essential to pupils of this age. The work is chiefly elementary agriculture and horticulture in continuation of previous garden work and of the indoor studies outlined above.

Use is made of common plants of the home and vegetable garden; also of important plants which are relatively unknown to the pupils, as sugar beets, peanuts, broom-corn, etc. Constant effort is given to secure from each pupil a genuine interest in the habits and needs of the particular plants he is growing, the soil, watering, lighting, and the injurious insects that attack them. A fine quality and quantity of result in flowers, vegetables, or fruit is an appreciable end to the pupil. This is not likely to be secured without care, industry, and study.

The work has proven full of interest and value. It furnishes concrete experience which makes significant the indoor experiments and study upon the structure, water content and water-lifting power of soils, soil replenishment and the relation of leguminous plants to soils. The work of this grade supplies a first-hand basis of interpretation for later work in elementary science, as well as for other subjects of the curriculum.

The following are skeleton outlines of Fifth Grade lesson plans as used by Miss Myrta McClellan of the University Elementary School.

The work of the first two weeks deals with seed distribution. The subject is introduced by a discussion of how in the home the children are cared for until mature, when they go to homes of their own. From this the question is raised as to how plants care for their seeds and how seeds get into new homes. The short time that a mature seed remains with the parent plant is a point for emphasis. There follow discussion and listing the agencies of seed distribution; a field trip for collection of all available kinds of seeds and fruits; this is a Saturday trip and much of the day is given to it; structure of the seeds and fruits studied, experiments with them, and a classification under headings indicating how the pupils think they are distributed; collection of collateral evidence (books and experiences of others) to test correctness of conclusions; learn to recognize different kinds

of seeds by sight; plant seeds in pots, see what ones will germinate at this time of year, note characteristics, record in notes and drawings for future use in garden and outdoor work.

Reproduction of plants by means of cuttings is next considered. Discuss manner in which the children think cuttings must be made. There must be stem, bud, and leaf. Discuss kind of soil for planting; clean sand is best until roots need nourishment. Have each child make a cutting and plant it. Discuss watering, lighting, and covering. Have children develop reasons so far as possible. Working in close quarters in schoolroom will require great care and neatness. Label all work done. Write a story of the cuttings and their treatment. Summarize in one lesson all work done up to date.

During the winter should come a series of lessons upon cattle, beginning with the uses of cattle, milk, cream, butter, cheese, draft animals, plowing, road animals, to propel machinery, for threshing grain, for riding. Use pictures and reading-matter as basis of work. Uses of cattle for beef; parts used, parts most valuable, best types of beef cattle, of dairy cattle; visit stock-yards. Needs of cattle for best growth, regions of largest production of cattle, relation of climate to production of cattle. Disappearance of former cattle ranches as permanent agriculture develops.

Cattle ranges of steppes of Russia, the plains of Australia, the Llanos of the Orinoco, and the pampas of Argentina. Milk cattle and dairy cattle the next topic. Dairy cattle of the U.S., Holland, Canada, Norway, Switzerland, Denmark. Value of their products. Zebu of India as a type of cattle not usually seen in this country. The value of each in the nation to which it is native.

Before leaving the subject of cattle, a brief review. Add a discussion of the tsetse fly as a deadly enemy of cattle and the fact that parts of Africa have no cattle probably because of this.

The horse as a factor in man's work and development of the country the next topic of study. This covered in two lessons as the children are able to use the work on the cow and compare the work on the horse with it in such a way that little additional

time is needed. The horse is more useful to a man merely because of his greater speed.

As a means of ascertaining what the children are getting from the study of birds, Miss Milam, at present fifth-grade teacher in the University Elementary School, asked the children to write a brief paper upon a common bird of economic value. This exercise was unannounced until the time of beginning it, and but a few minutes were allowed for it. Two sample papers are here presented. The papers are exactly as handed in by the children, and while faulty in some ways show some definite results.

MAY 4, 1910. GRADE 5

The robin is a bird of economic value. It is quite a tame bird and is a friend of everyone. The robin was first known in Massachusetts but was brought further south and is now mostly all over the United States. It's appearance is gray and orange. The back is gray and the breast is orange. It is nine inches from the tip of the bill to the tip of the tail. It feeds mostly on angle worms but partly on fruit and grain.

MAY 4, 1910. GRADE 5

One of the birds of economic value is the Robin. He is a friendly bird and does good by eating the harmful insects that eat the vegetables. He goes south every year and returns in the spring builds his nest and lays pretty blue egg and then the little birds hatch out of the eggs learns to fly and it is then time to go home. He has a red breast and a brown back.

The sparrow is another bird but he is not of economic value. He drives the other birds away and takes their food away. He has onley one friend and that is the truck gardner. He stayes here all winter. His breast is grey and his back is brown.